IMPROVING REAL TIME ESP BY SUPPRESSING THE FUTURE: TRANS-TEMPORAL INHIBITION

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SUMMARY

During retrospective analysis of the data of a highly successful experiment on teaching real time ESP ability through the provision of immediate feedback of results, extremely strong, below chance missing of the immediately future target was found, a precognitive ESP effect. This avoidance of the future was highly correlated with the magnitude of the real time ESP used: the more real time ESP hitting, the more the immediate future was avoided. These results are consistent with a theory of another dimension of the mind, the duration of whose "experienced present" includes times which, to ordinary consciousness, are past and future. Tapping into this other mental dimension is not useful for using real time ESP per se, for past and future information constitute noise. Trans-temporal inhibition, a type of edge detection process extending over time, enhances detection of the desired real time ESP information by actively suppressing the ESP derived information about the immediate past and future (postcognition and precognition). Application of this theory allows calculation of the degree to which percipients are strategy-bound, applying maladaptive guessing strategies instead of trying to detect relevant ESP signals. An initial experimental test of one of the implications of the theory, shifting of the areas of inhibition by change of psychological focus, further supports the theory. A relatively universal information sharpening technique thus seems to be employed in using ESP.

One of the major problems that undermines efficient functional study of the nature of extrasensory perception (ESP) is the unreliability, overall low level of manifestation, and prevalence of decline effects when ESP is studied in the laboratory. In the vast majority of experiments, even when ESP is present to a statistically significant degree, the vast majority of responses made by percipients are simply guesses, and only a very tiny fraction of them are ESP: the signal to noise ratio is very poor, making study of the characteristics of the signal difficult. As percipients continue to work at ESP tasks, it is very common for them to decline in performance and eventually be reduced to mere chance guessing.[1,2] Ten years ago[3] I theorized that this was due to lack of immediate feedback to percipients, so they could not learn to distinguish subtle characteristics of mental events that indicated when they were generally using ESP from mere guessing processes. This theory has recently been elaborated.[4]

Two major studies have now been carried out in my laboratory, one already published[5] and the second[6] being prepared for publication, that strongly support the hypotheses that: (1) the provision of immediate feedback to percipients with some ESP talent at the start of training can slow down or eliminate the common decline effect (stabilize performance); (2) can allow some percipients to learn; and (3) the degree of learning (improving performance) in the feedback situation is directly proportional to the ESP level a given percipient initially brings to the training sessions. These developments suggest that efficient functional studies may soon be possible.

In the course of post hoc analysis of the first Training Study, some remarkably strong effects produced by precognition, ESP cognition of immediately future events, were discovered, and confirmed in subsequent analysis of the second Training Study data. These precognitive effects, and their theoretical implications for an information processing mechanism used for enhancing real time ESP, named trans-temporal inhibition, will be the focus of this paper. The data on learning ESP per se are available elsewhere,[5,6] and will not be discussed further here except when they are relevant to the main focus.

OVERVIEW OF THE EXPERIMENTAL PROCEDURE

Figure 1 provides an overview of the general procedure of each of the two studies. Since the learning theory predicted that percipients had to have some demonstrable ESP to begin with for feedback training to have much effect, it was necessary to start with relatively talented percipients. Since percipients who can demonstrate individually significant ESP in a short period of testing were assumed to be relatively rare, a two-stage selection procedure proceeded the actual Training Study. In the first stage, teams of experimenters gave quick ESP card guessing tests to large classes of UC Davis students. Students who showed individually significant ESP hitting were selected from these results.

In screening hundreds of students a certain number were bound to score at least at the .05 level of significance by chance alone, so those selected students who accepted our invitation to participate in the second stage Confirmation Study were given

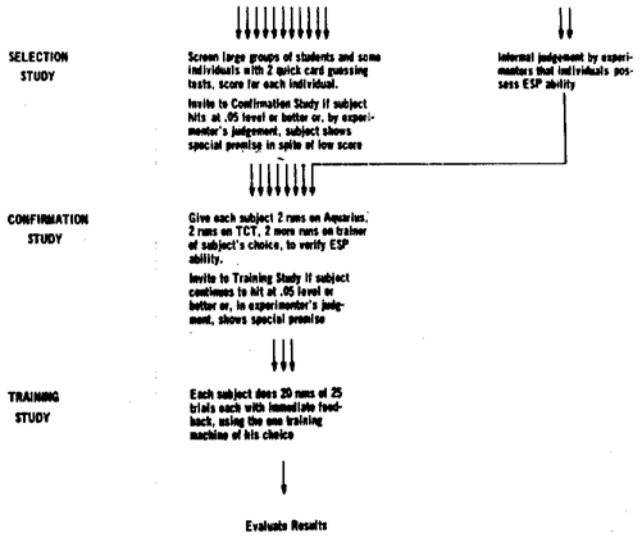

Fig. 1. Sequential selection procedure in the two Training Studies.

six individual test runs of 25 trials each. Two were on the ten-choice trainer (described below), two were on the Aquarius Model 1000 ESP trainer, a four-choice machine, and two more on whichever of the two machines each student preferred to do two more runs on. Since it would be highly unlikely that a student who made the criterion in the Selection Study by chance alone would also make the criterion of individual significance in the Confirmation Study ($\sqrt{.05} \times \sqrt{.05} = .0025$), we assumed that almost all students who scored significantly in both studies probably had genuine ESP talent, and they were invited to the Training Study.

A few students went directly into the Confirmation Study without going through the Selection Study because individual experimenters had other reasons to suspect they might have demonstrable ESP ability.

We will deal only with data from the ten-choice trainer (TCT) in both the Training Studies in this paper, as individual trial data was not recorded for the Aquarius four-choice trainer in the first study. Ten student percipeints completed the first Training Study and seven new percipients completed the second Training Study. "Completed" means doing 20 runs of 25 trials each on the TCT, over several sessions, our a priori criterion. Results in this paper deal with Training Study data.

THE TEN-CHOICE TRAINER

The TCT consisted of a percipient's and experimenter/sender's console. The two consoles were located in separate rooms, as shown in Figure 2. The percipient or "receiver" was alone in the laboratory room shown in the lower left-hand corner of Figure 2, sitting in front of his

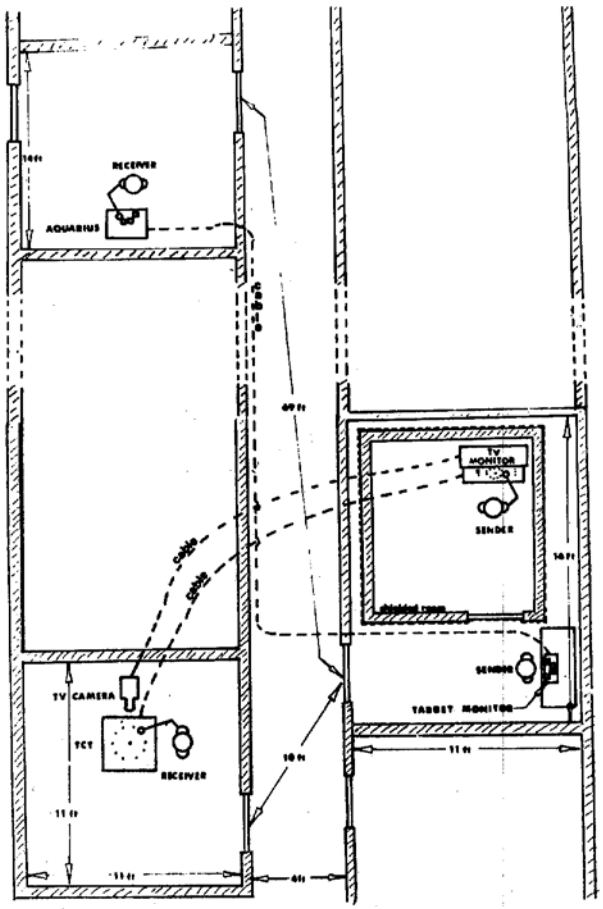

Fig. 2. Arrangement of the experimental laboratories.

console. A TV camera was focused on the console. The experimenter/sender was inside a Faraday cage constructed of thin copper sheets soldered together over an otherwise ordinarily constructed room, and this Faraday cage was inside another room, across the hall from the percipient's room. The shielding of the Faraday cage was not intact, however, due to power cables and the TV monitor and TCT interconnecting cables. The laboratory arrangement for the Aquarius 4-choice trainer are also shown, although I shall not deal with data from that trainer in this paper.

Figure 3 is a diagram of the arrangement of the percipients' console. It had ten unlit lamps arranged in a circle about 15 inches in diameter, with a miniature playing card glued beside each lamp to numerically identify them. A response push button was located beside each lamp. When the Ready lamp in the center of the console came on, the percipient knew that the experimenter/sender had selected (in accordance with the output of a random number generator, to be described later) one of the ten lamps as a target, and was trying to telepathically "send" the identity of that target to him.

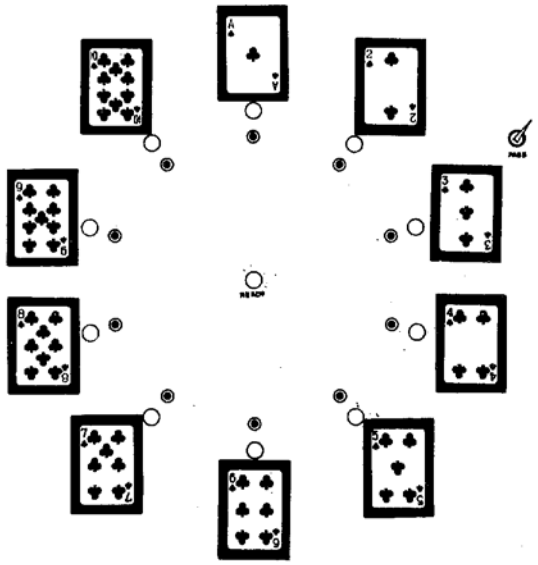

Fig. 3. Layout of the percipient's (receiver's) TCT (ten-choice trainer) console. Target #4 is shown as lit, indicating it was the correct target for whatever the percipient's response was.

The percipient could respond quickly or take as much time as he wished to make his decision. When he had decided on which number he though the target was, he pushed the response button beside it: electrical circuitry immediately scored his response as a hit or miss, and lighted the lamp on the percipient's console which corresponded to the correct target, so the percipient had immediate feedback on whether he was right or wrong. When he was right a chime rang inside his console, as well as the correct light coming on.

If, on a given trail, a percipient felt he had no idea what the target was, he could push the Pass switch, signalling to the experimenter/sender that he would like a new target. A pass was not counted as a hit or miss, and no feedback on correct target identity was given. Percipients rarely used the pass option. A circuit diagram of the TCT is available elsewhere[5].

Figure 4 is a drawing of the experimenter/sender's console and the TV monitor mounted above it. Except for operating controls, such as power switches, this console was laid out identically to the percipient's console.

In pilot work with the TCT, my students and I found that many percipients would slowly run their hand around the circle of unlit lamps, trying to get some kind of "impression" as to when they were over the correct lamp. The TCT was designed so no electrical or physical differences of any sort existed[5], so, on the null hypothesis of no ESP, this was an irrelevant procedure. Because of this, however, we had a TV camera focused on the percipient's hand movements so the sender could tell when the percipient was "hot" or "cold," and so could intensify, diminish or modify his sending effort accordingly.

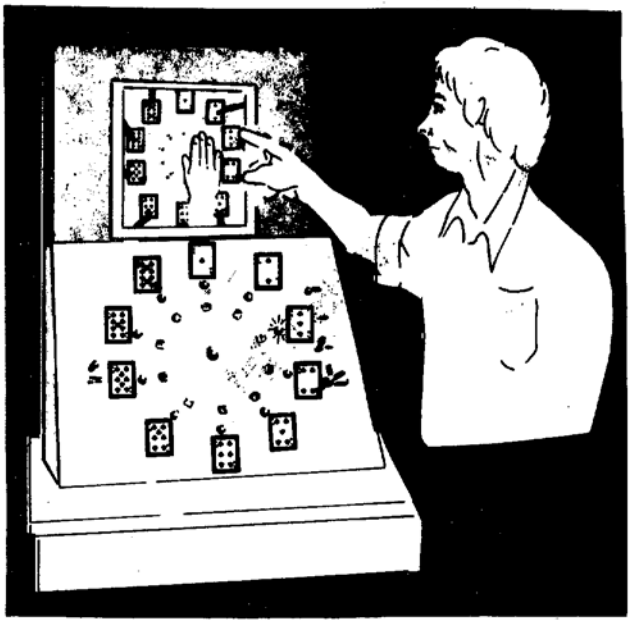

Fig. 4. Layout of the experimenter/sender's TCT console. Target #3 has been selected and the experimenter, watching the image of the percipient's hand movements on the TV monitor, is trying to "send" the percipient a telepathic message to "Go back!" since the percipient has just moved his hand past the correct #3 target to the #2 target.

The experimenter/senders found this full feedback of ongoing process to sender to be extremely involving, and I think it is quite important, although I have not assessed its effect independently. In terms of training people to use ESP, we were actually training each experimenter/sender and percipient as a team, with full feedback to each.

Electrical counters on the TCT automatically recorded the number of trials and the number of hits. Runs were standardized at 25 trials. If, as rarely happened, the pass option was used, additional trials were given so the total of scored trials was 25. On other rare occasions, when an experimenter accidentally ran one or two more trials than 25, all data beyond 25 trials were deleted.

RANDOM NUMBER GENERATOR

Target selection was controlled by an electronic random number generator (RNG). This

was of the "electronic roulett wheel" type, with one megahertz clock cycling a zero to nine counter over and over again. The length of time the clock was connected to the counter was controlled by the experimenter/sender manually depressing a push button. Since controlable human reaction time is several orders of magnitude slower than the clock speed, which output from zero to nine is selected is a random event. The circuit of the RNG, designed by Dana Redington, is shown in Figure 5.

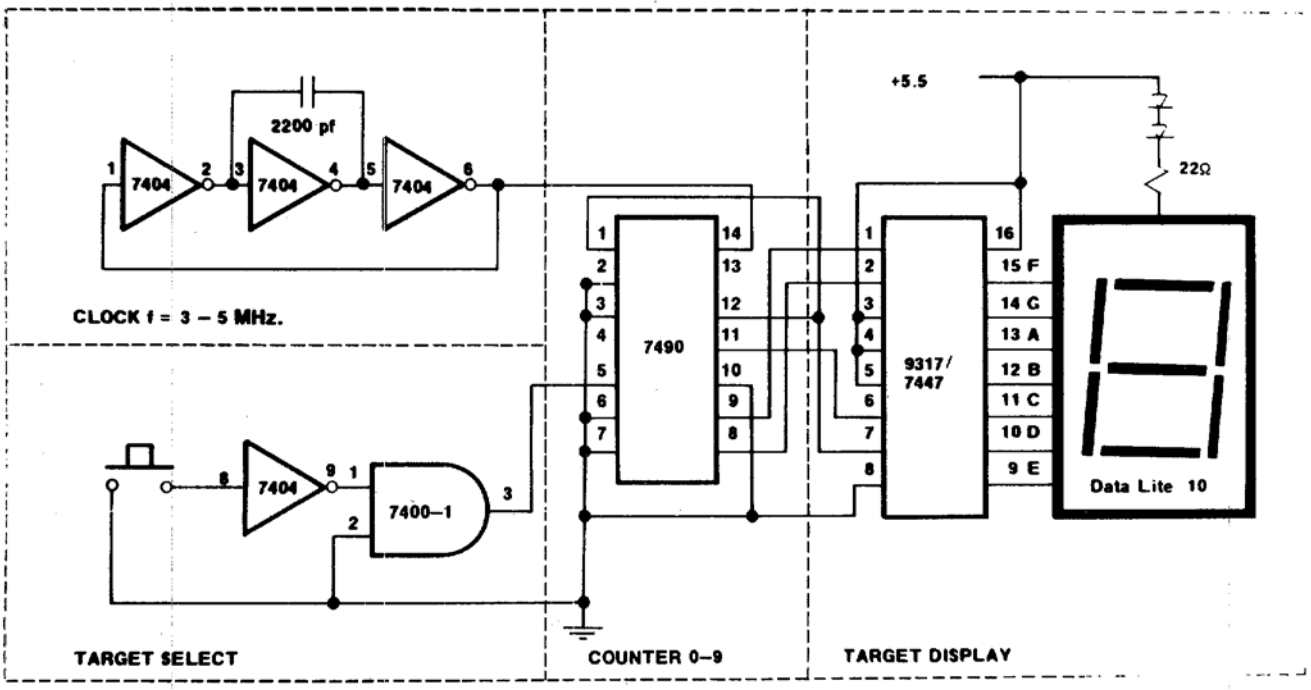

Fig. 5. Circuit of the random number generator (RNG) used to generate targets for the TCT. Integrated circuits are Signetics types 7404, 7400, 7447, and 7490. Seven segment display is a Litronix Data Lite 10.

Empirical tests, using a Chi-square analysis for equal incidence of individual targets and equal incidence of all 100 possible pairs of target selections, on 1000 trial test blocks collected before and after the first Training Study, showed satisfactory randomicity. We did not test for even higher level possible sequential effects (triplets, quadruplets, etc.) as there is no theoretical reason to expect any sequential effects with this type of RNG.

The TCT was used to gather the data in the first Training Study. We replaced it in the second Training Study with a more sophisticated and somewhat more automated version, ADEPT (Advanced Decimal Extrasensory Perception Trainer), designed and constructed by Dana Redington[7], which was similar to the TCT except for the fact that individual trial data was recorded automatically by teletypewriter, and the RNG was internal to the machine, whereas with the TCT the individual trial data was recorded by hand and the RNG was external to the machine. Total trials and total hits were both recorded automatically on both machines.

PSYCHOLOGICAL FOCUS ON REAL TIME EVENTS

In both Training Studies, neither I, my experimenters, nor the percipients had any interest in precognition. Our conception of the experiment was that we were trying to train real time ESP, either clairvoyance (direct perception of the state of the TCT) or telepathic (perception of the experimenter/sender's knowledge of the correct target) transmission of ESP information. This psychological focus is important to note, in light of later results.

Figure 6 illustrates the temporal aspects of target generation. Given that a target had already been generated and the TCT activated (Ready light comes on on the percipient's console) for trial N, a percipient would take a variable period of time, from a second or two to sometimes minutes, to decide on what he

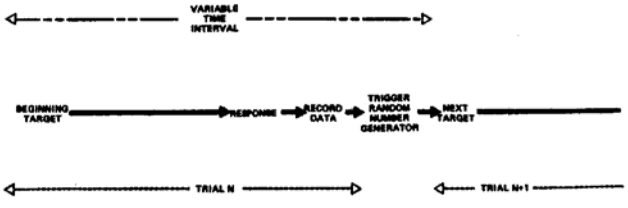

Fig. 6. Temporal sequence of target generations.

thought the target was. He would then push a response button, giving himself feedback and lighting a target lamp on the experimenter/sender's console showing what the percipient's response had been. The experimenter/sender recorded the response on his record sheet (the target had already been noted), turned off the TCT, and then triggered the RNG to select the next random number. When this selection had been made, in a second or so, he switched on the target lamp for trial N + 1.

During the time that a percipient was trying to use ESP to determine what the current, real time target was, then, the target for the next trial had not yet come into existence, nor could it be inferred from any knowledge of current events. The RNG had not yet been activated. Any significant information about the future targets, then, would have to be due to precognition.

SCORING RESPONSES

For evaluating the presence of ESP and subsequent analysis of learning effects, we were interested in real time hits, and all scoring was done for such hits. The top third of Figure 7 shows data from an actual run from percipient E1S5. The top row shows the 25 targets that were sequentially generated, the second row the percipient's response to each one. Real time hits are circled. There were six of them for this particular run. This happened to be an individually significant run, as the exact 1-tailed binomial probability of 6 or more hits in 25 trials (with a P of .1) is 3 in 100.

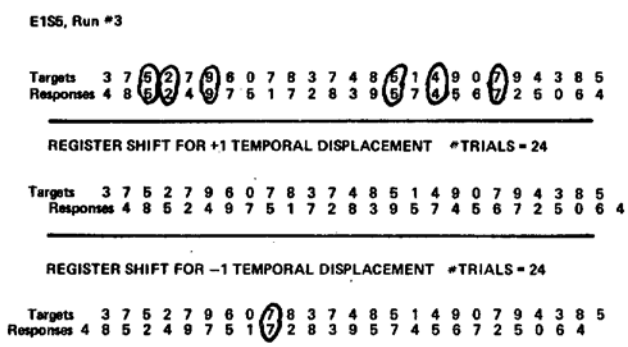

Fig. 7. Target and response sequences for percipient E1S5, third run, illustrating scoring techniques for real time hits, +1 precognitive hits, and -1 postcognitive hits.

Although I knew that it was relatively routine in parapsychological experiments to check for possible precognitive effects, I personally had no real interest in them, and had not gotten around to such checking until some analyses for another purpose by a colleague in the Genetics Department, Lila Gatlin, suggested to me that there were important precognitive effects worth looking at. The computer was reprogrammed to do temporal displacement analyses then, in the style shown in the middle and lower thirds of Figure 7.

To see if a response given by a percipient at time N was a hit or a miss on the target at trial N +1, the +1 temporal displacement, the response register was uniformly shifted one position forward in time. In the example shown, there were no hits with this procedure. N is reduced to 24 for such a shift, as the last response has no future target to be scored against.

To look at -1 past temporal displacement, as shown in the bottom third of the figure, the response register is shifted uniformly backwards one position. In this case there was 1 hit by this procedure. N is again reduced to 24. A similar procedure allows looking at any temporal displacement, forward (+1 through +24) or back (-1 through -24).

In looking at possible hits displaced forward in time, any significant deviations from chance expectation must be due to some kind of precognitive ESP, for, as discussed earlier, these targets did not yet exist and could not be predicted from any knowledge (sensory or extrasensory) of current events. In looking at temporal shifts backwards, my immediate reaction was to believe these would indicate something about ordinary psychological processes in the percipient: because of the immediate feedback of results, percipients knew what the immediately past target had been (to the extent that they had not forgotten it). The situation may be more complex than that for past displacements, however, as we shall see later.

ESP MISSING

An interesting effect that has been reported in many dozens of published ESP experiments[8,9] is what is called ESP-missing (or psi-missing), scoring that is significantly below chance expectation. Scoring below chance expectation can indicate as much ESP is operating as scoring above chance expectation can. If you are guessing whether the cards in an ordinary deck are red or black, for example, getting zero right is just as significant as getting all 52 right.

In terms of a model underlying the process, some non-conscious part of the mind must use ESP to correctly identify certain targets, and then influence conscious guessing processes to make sure that these targets are not guessed correctly. This has been associated with motivation in a number of parapsychological studies:

percipients who have an a priori disbelief in ESP, and who are statistically naive, but who (like most of us), think that the worse you score on a test the less you know, have often been shown to score significantly below chance, thus thinking they have validated their belief that there is no such phenomena as ESP[10,11].

ESP MISSING IN THE FIRST TRAINING STUDY

The 10 percipients who completed the first Training Study showed exceptionally significant results in terms of real time hitting. For their total of 5000 trials[12], we would expect 500 hits by chance, but 722 were observed. The two-tailed probability of such an occurrence, using the normal approximation to the binomial, is 2×10^{-25}. This corresponded, for the group as a whole, to an average of 3.61 hits per run of 25, rather than the average of 2.50 expected by chance.

There was considerable individual variation, of course, with a few percipients apparently having their overt manifestation of ESP suppressed in terms of real time hitting and not showing individual significance, a finding often associated with changes in psychological conditions[8] such as we had in going from the Confirmation to the Training Study. But five of the 10 percipients showed exceptionally significant individual scores. The least of these 5 averaged 3.90 hits per run, for a P of 4×10^{-5}, and the most significant averaged 6.20 hits per run, for an individual P of 4×10^{-28}.

In scoring for hits on the +1 future trial, there were 4,790 trials where a hit could have occurred (a few possibilities were lost when an experimenter inadvertently gave only 24 trials in a run, as well as the routine loss of 1 trial in each run), so 479 hits would be expected by chance. Only 318 hits occurred: this would occur by chance with a 2-tailed probability of 8×10^{-15}. Thus some part of the percipients' minds was occasionally using precognition to know what the +1 future target was and then affecting the conscious guessing of the real time target to be sure it was not what the +1 target would be. All other possible future displacements (+2, +3 . . . +24) were checked, but were not of such obvious significance, and so will not be reported on in this paper.

Past temporal displacements were also checked, and a rather regular pattern was found for the -1 and -2 displacements. Figure 8 is a bar graph of this for a percipient, E1S1, whose individual pattern is typical of that of many other percipients. He made 78 real time hits, when 50 would be expected by chance, $P = 4 \times 10^{-5}$, 2-tailed. His avoidance of the immediate +1 future was also extremely significant, $P = 3 \times 10^{-4}$, 1-tailed. His avoidance of the immediate -1 past was even greater, $P = 5 \times 10^{-8}$, 1-tailed. This avoidance of -1 past targets being greater than

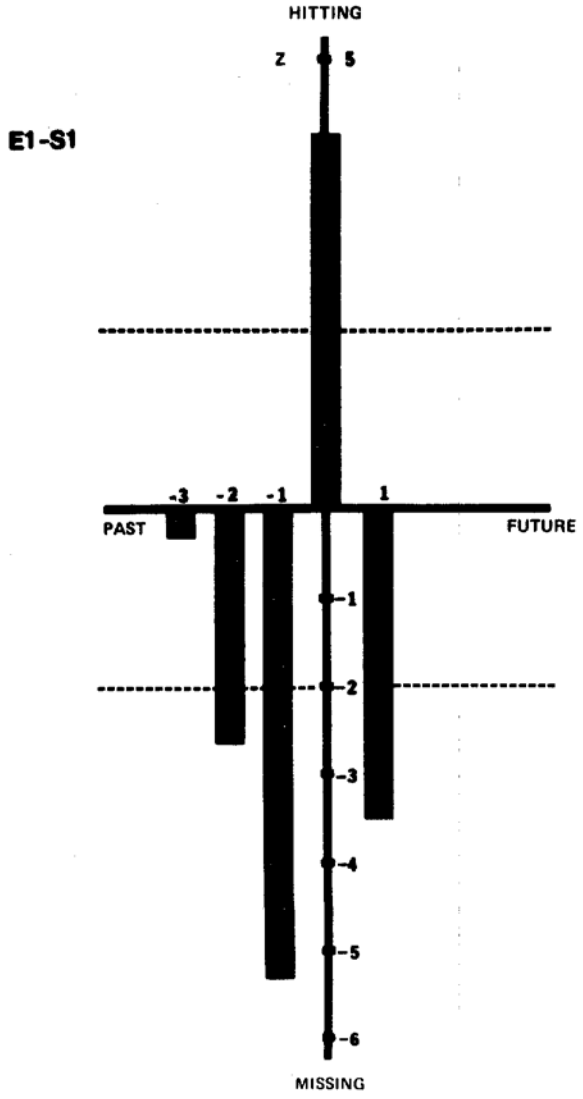

Fig. 8. Scoring pattern over all 500 trials (20 runs) of percipient E1S1 for -3, -2, -1, real time, and +1 temporal displacements. Units of vertical axis or standard normal deviates (Z-scores, σ).

the avoidance of the +1 future was the typical pattern for almost all percipients.

The past targets at the -2 displacement were also significantly avoided, but by the -3 displacement and for other greater temporal displacements, the group average was generally small, being only non-significant variations around chance. This suggests something in accordance with known psychological facts about people's guessing habits, namely that percipients strongly avoid making their guess identical to what the immediately previous target has been, a similar psychological avoidance holds, but is not quite so strong, by two targets back, and is pretty much inoperative by

three or more targets back.

RELATIONSHIP BETWEEN REAL TIME HITTING AND AVOIDING THE FUTURE

It turns out that this precognitive avoidance of the immediate +1 future in the first Training Study was not an isolated event, but was quite strongly and negatively related to the degree of real time hitting. Figure 9 shows the magnitude of the real time hitting and the +1 missing (hitting in one case) for each individual percipient. The vertical axis is Z or σ score, with anything greater than 2σ conventionally being accepted as statistically significant. I

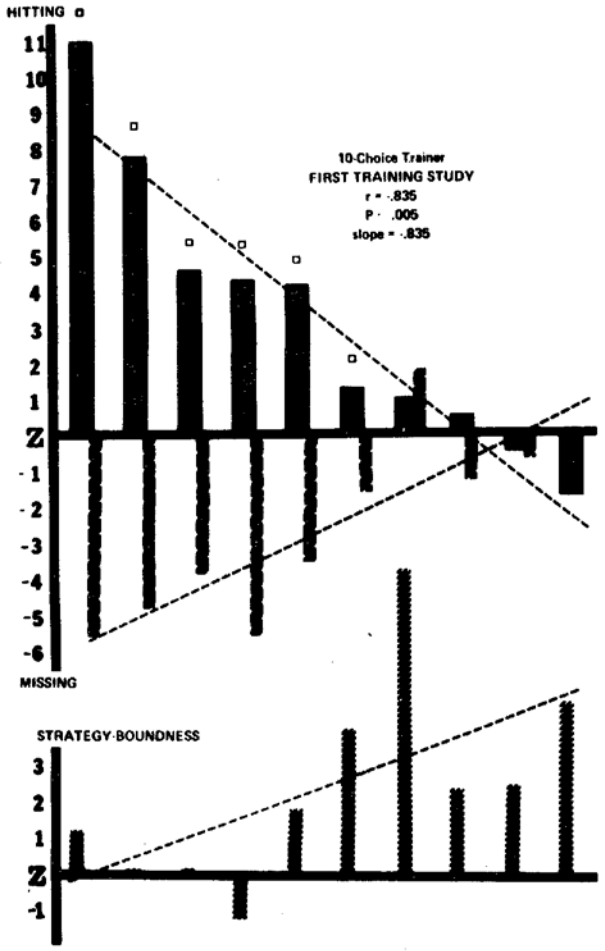

Fig. 9. Relationship between real time hitting, +1 future missing, and strategy-boundness, first Training Study.

have ordered the real time hitting scores from the highest on the left down through the greatest degree of missing on the real time target to the right. The rather good ordering of missing scores on the +1 future target that then results is an indication of the strength of the relationship between these two measures, which, statistically speaking, should be totally independent. The dotted lines are fitted regression lines. As can be seen, there is an extremely strong relationship: the more a percipient tends to hit on the real time target by ESP, the more he tends to avoid the +1 future target. The correlation is $-.835$, $P < .005$, 2-tailed. A rank order correlation, which makes somewhat less assumptions about the characteristics of the numerical scaling[13], gives $r = -.89$, a slight increase. We shall consider the lower graph, labeled strategy-boundedness, later.

The small squares beside each individual percipient's data indicate when the real time hits were significantly different from the +1 future missing by a t-test, applied over the 20 runs of each individual percipient. Six of the 10 percipeints show such significant differences, including one whose real time hitting no longer showed individual significance by itself.

As a further test to be certain that the negative relationship between real time hitting and +1 future missing in the first Training Study did not result from peculiar numerical properties of the target and response sequences, a control experiment was carried out in which the target sequence for each percipient was paired with the response sequence from some other percipient and the same analyses carried out. There were no significant "real time" hits, no significant +1 missing, and no relationship between the two.

PSYCHOKINESIS AS AN ALTERNATIVE TO PRECOGNITION?

Because numerous studies have shown that humans can influence the output of electronic RNGs simply by willing some outputs to come up more frequently[14] (psychokinesis, PK), and because we could not be sure that some of our percipients might not unconsciously use PK on the RNG, rather than just using ESP to know the state of the machine or the experimenter/sender's mind, we made an a priori decision to test our RNGs for randomness before and after our Training Studies, but not during them, when percipients might be "on line" in the sense of being concerned about and possibly influencing the RNGs.

As a post hoc, exploratory study, we did test the individual target sequences of each percipient for randomicity, and found that 3 of the 17 sequences (both Training Studies combined) did show statistically significant departures from randomicity, as per our hypothesis that our percipients might unconsciously use PK on the RNGs. Two of the nonrandom target sequences were for the two highest scoring percipients in the first Training Study, E1S3 and E1S5. Although the magnitude of these target sequence departures from randomicity was small compared to the magnitude of the ESP effects, suggesting that these percipients occasionally used PK on the RNG but

were mostly using ESP, I did check the correlations between real time hitting and +1 future missing to see if they would be affected if the data from these two percipients were thrown out. The differences were trivial and can be ignored: for the first Training Study, r = -.81 instead of r = -.84.

REPLICATION OF EFFECTS IN THE SECOND TRAINING STUDY

The second Training Study was not as successful as the first in terms of magnitude of real time ESP shown, an unfortunate, but predicted, effect. Our second Selection Study and second Confirmation Study did not give us individual percipients with as high scores as we had in the first Training Study. The group of percipients who entered the first Training Study had Confirmation Study scores ranging from 2.50-6.00 hits per run of 25 (chance is 2.50), with a mean group score of 4.78, while the corresponding range was 2.75 to 4.50, group mean of 3.61 hits/run, for the percipients who completed the second Training Study. The difference was statistically significant ($P < .05$, 2-tailed, by t-test). Ideally, we should have run more students through our Selection Study and Confirmation Study procedure, and made the ESP talent level comparable to that of the first Training Study. Time, money, and manpower shortages prohibited this, so we used the percipients we had, but predicted that our overall level of ESP would be smaller in the second Training Study. It was.

Seven percipients completed the second Training Study. The overall group mean (2.61) did not differ significantly from chance expectation, although two of the seven percipients showed individually significant results. One of these percipients showed individually significant real time hitting (average of 3.20 hits/run, $P < .05$, 2-tialed), the other showed individually significant real time missing (average of 1.85 hits/run, $P < .05$, t-tailed), so they effectively cancelled each other out.

Figure 10 shows the individual percipient results for real time scoring and +1 missing or hitting. My hypothesis that we still had talented ESP percipients, but that the increased pressure of the Training Study had probably inhibited their ESP abilities, as in the first Training Study, was confirmed. Five of the seven percipients showed individually significant differences (t-test) between their real time scores and +1 future scores. The negative relationship between real time hitting and +1 missing was again confirmed, with r = -.733, $P < .05$, 1-tailed. The more conservative rank order correlation gives r = -.79, a slightly stronger effect. The slight apparent reversal of the effect for the top three real time hitters does not detract substantially from the overall correlation. It might suggest

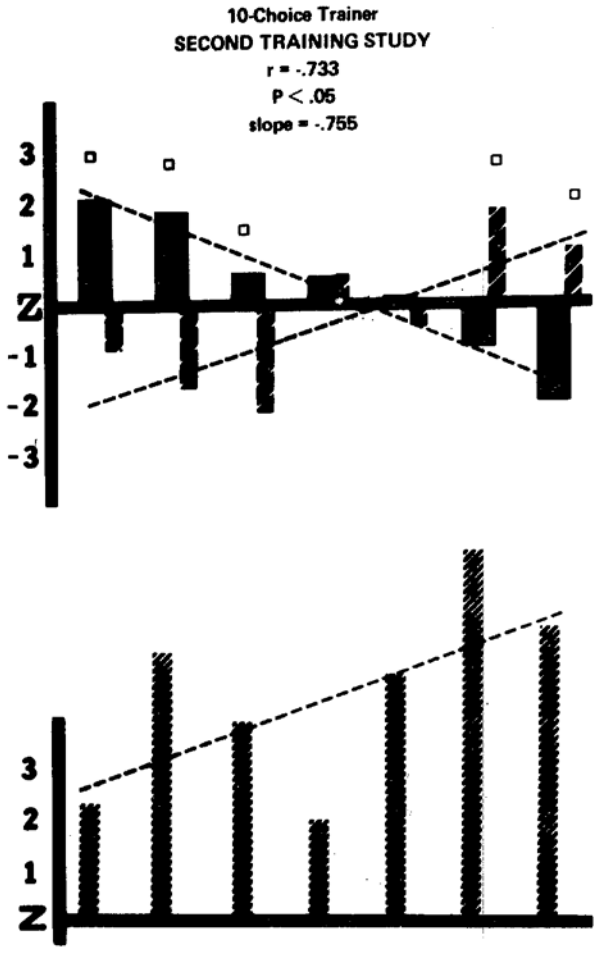

Fig. 10. Relationship between real time hitting, +1 future missing, and strategy-boundedness, second Training Study.

non-linearity, but, given the following discussion, this is unlikely.

As in the first Training Study, I carried out an exploratory, post hoc analysis for possible nonrandomicity in the percipients' target sequences that might represent a PK effect. One of the seven target sequences, for percipient E2S10, showed too many 7s. Curiously, this percipient scored almost exactly at chance expectation (51 hits versus 50 expected) for real time hits. Conservatively deleting the data of E2S10, however, again has a negligible effect on the correlation between real time hitting and +1 future missing: r = -.74, $P < .05$, 1-tailed.

In many ways, the percipients from the Second Training Study amounted to a sampling of the lower end of the distribution sampled in the first Training Study, so I combined results of the two Training Studies, to produce

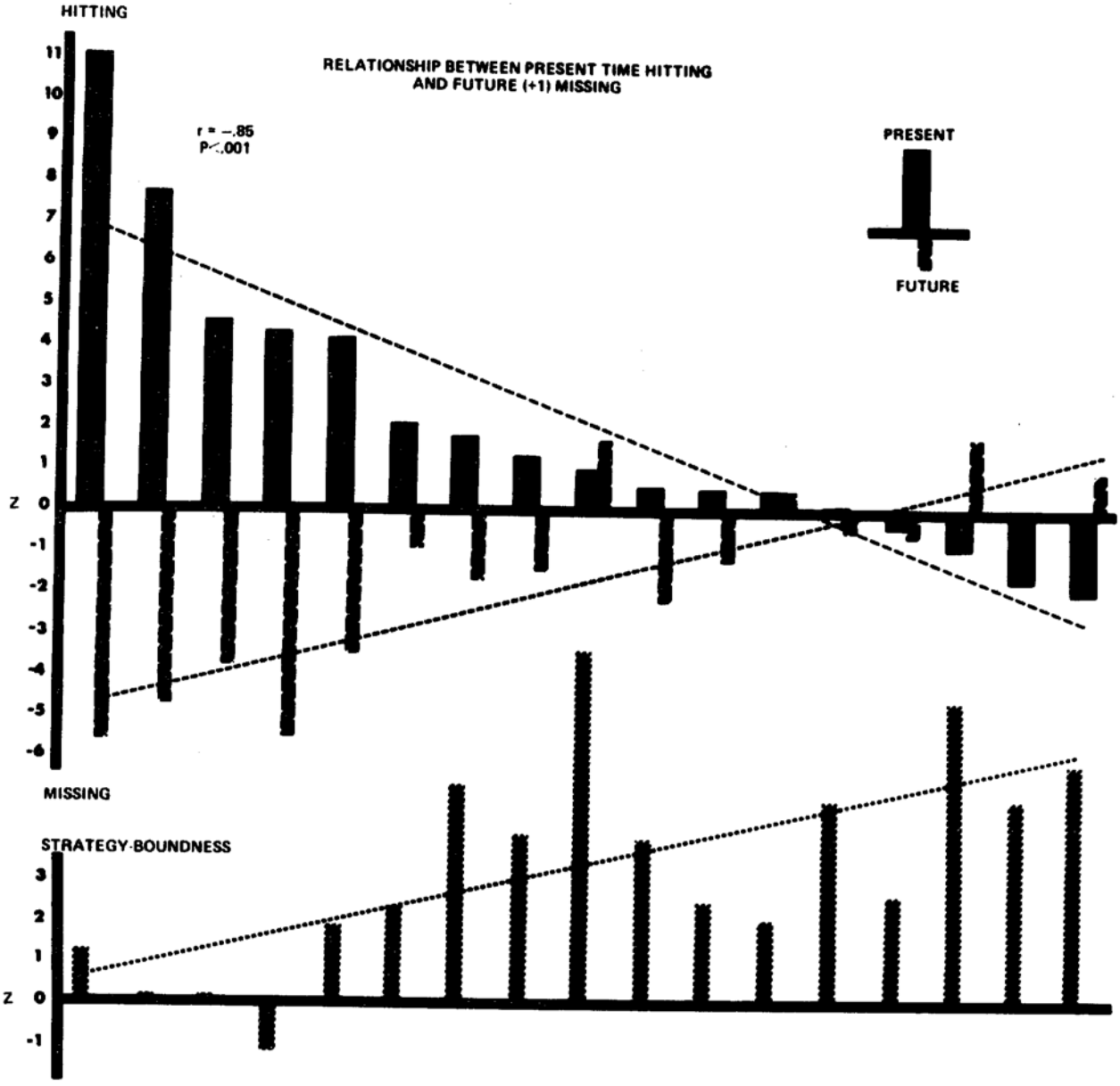

Fig. 11. Relationship between real time hitting, +1 future missing, and strategy-boundedness, combined data of both Training Studies.

the diagram shown in Figure 11. Here the strong negative relationship between real time hitting and +1 missing stands out very clearly ($r = -.85$, $p < .001$, 2-tailed). The more conservative rank order correlation is also -.85. The highly successful real time ESP percipients strongly suppressed the immediate future, while the ones who, under the increased psychological pressure of the Training Study, tended to switch to missing in real time, an incorrect focusing of the ESP effect, showed some tendency to switch to hitting on the immediate future.

If, to be very conservative, the data of the three percipients showing nonrandom target sequences are deleted from the overall correlation, the change is negligible, with r changing from -.84 to -.82 instead, so the data from these three percipients will be left in. More microscopic analyses, aimed at distinguishing these small possible PK effects from ESP effects will be undertaken in future publications.

Such a significant, negative relationship between real time hitting and +1 missing has not, to my knowledge, been previously reported in the experimental parapsychological literature[15]. This may be partly due to the fact that it has not been looked for, but I also suspect it is partially due to a procedurel

difference. In the present Training Studies, there was a sequential generation of targets "on line," as it were. In most parapsychological studies, until fairly recently, targets have been thoroughly shuffled decks of cards. In precognition studies with cards, the entire sequence of future targets is generated simultaneously when they are thoroughly shuffled at a future time, rather than being generated one by one after each real time response.

I shall now present the theory I have devised to explain these results. I am deeply indebted to Enoch Callaway, a colleague at the Langley Porter Neuropsychiatric Institute, who, after seeing a preliminary analysis of this data, suggested that they resembled a neural inhibitory surround, and started the train of thought in me that led to the following theory.

THE DURATION OF THE PRESENT

If you will stop to ask yourself what is "present" to your experience, you will find that your experienced present, although very short, definitely seems to have a certain duration. The mathematical abstraction of the present being a temporal point of zero width, sandwiched between past and future, is a useful abstraction in a variety of applications, but a poor representation of psychological experience. In Figure 12, the heavy lines model what we might call, by analogy with filters, the "passband" of the experienced present. For some small duration,

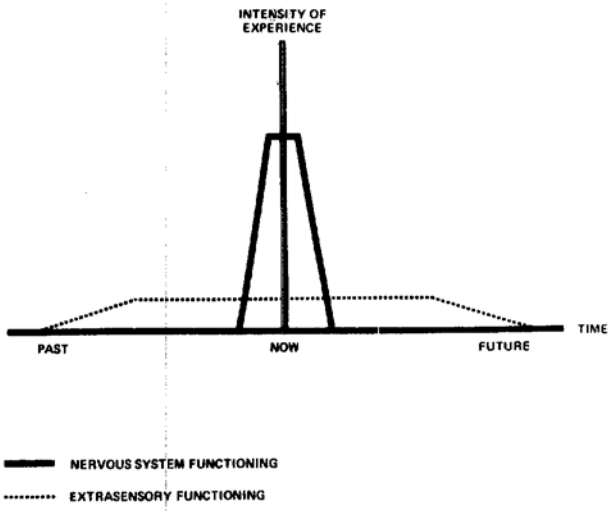

Fig. 12. Intensity and duration characteristics of the experienced present for ordinary consciousness (heavy lines) and the extended aspect of the mind that uses ESP (dotted lines).

centered around the now, all actions and experiences are now. The length of this interval is slightly variable, depending on how our attention is focused, and probably is ordinarily somewhere between one-tenth and two-tenths of a second wide. Within this experienced now, the intensity of experience (the vertical axis) is very high. At the edges of the passband experience drops in intensity and clarity. Dynamically, we should picture this passband as moving along horizontally from past to future. Whether experience within this passband of the experienced now is actually continuous or consists of discrete frames, with awareness of the inter-frame interval suppressed, is an interesting question.

An old psychological term for this effect was the "specious present," a term I do not like, as it shows that the mathematical abstraction was being considered more real than actual experience, implying that direct experience was specious. I shall speak of the experienced present, and its width. By using "outside" time sources, such as a clock, we can say that the experienced present has a definite width, even though to the mind, this small segment of time is all now.

PRECOGNITION AND THE EXPERIENCED PRESENT

There are dozens of published parapsychological studies indicating that precognition, under laboratory conditions, is a genuine phenomenon[8,9]. These results are usually conceptualized as the future "influencing" the present, or as information flow from the future to the past. Reactions to this data are frequently mixed with "absolute" questions about free will versus determinism or causality, and discussions get phrased in such absolute terms that they lead nowhere.

An alternative way of accounting for the data of precognition is to postulate that there is some other temporal dimension of mental functioning, a temporal dimension in which time "flows at a different rate" or some such thing, with the consequence that the experienced present of the mind in that other temporal dimension has a greater duration, a wider passband than our ordinary experienced present. This wider passband is shown in Figure 12 as the dotted line. The exact shape of the passband as drawn is not important: it merely represents that, ordinarily, the intensity of experience tapers off to near zero at some point.

I am proposing that the aspect of mind which is activated on those occasions when ESP abilities are used has two properties different from our ordinary consciousness, which seems spatially localized with respect to the brain and temporally localized with respect to the time system's physical processes of brain operation. The first property is that this other dimension of the mind is not so spatially

localized, and can thus somehow pick up information at spatial locations outside the sensory range of the body/brain/nervous system. The second property is that the center point of the experienced present of this other dimension of the mind can be a different time than the physical time associated with the body/brain/nervous system, and the band width of that other part of the mind's experienced present is wider than the band width of our ordinary consciousness's experienced present. Thus what is now in this other dimension of the mind may include portions of time that, from our ordinary point of view, are past and future, as well as present.

Since consciousness (or basic awareness, as I prefer to call it in my systems approach to consciousness[16]) is ordinarily fully identified and preoccupied with body/brain/nervous system functioning, the experienced intensity of the parts of mind that operates in this other temporal and spatial dimension is ordinarily quite low, usually below conscious threshold, and is shown accordingly so in the figure.

When a percipient is asked to use ESP, he must disregard ongoing sensory input (the experimental conditions make it irrelevant) and whatever fantasies or strategies he has about outguessing the RNG (since targets are equiprobable and sequentially independent), and try to "contact" or "tune in" to that aspect of mind which exists or is capable of using this broader spatial and temporal dimension. Considering the temporal aspects of it, this creates a problem. If your desire is to obtain real time information, being "sent" by the experimenter/sender in another laboratory, then simply tapping into the wider experiential present of this other dimension is not good enough: its now includes information about past and future events, as well as present events. Since your goal is present event information, this past and future information is noise which may interfere with detection of the desired signal.

Given the psychological set of experimenters and percipients in our studies, namely concentrating on getting the real time information by ESP, this implicitly defined the temporal boundaries of that real time information as the immediate -1 past and the immediate +1 future targets/trials. We shall consider effects of altering this psychological definition later.

Figure 13 models what a percipient must do to use ESP successfully, then, to get real time information. His awareness is receiving irrelevant sensory information that must be disregarded. His memories of what past targets have been may suggest guessing strategies, but they are irrelevant, since each output of the RNG is independent of the previous ones. He must occasionally tap into that dimension of mind that uses ESP, but since that part of the mind is getting

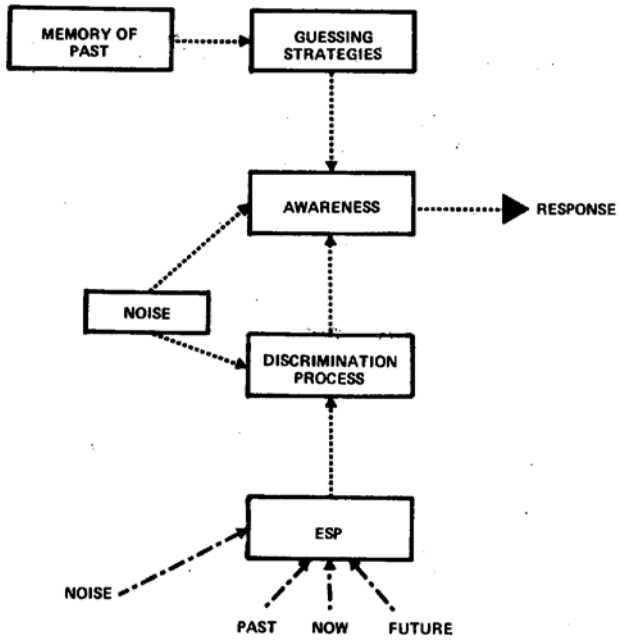

Fig. 13. A model of psychological processes used in making a successful ESP response.

information about past and future as well as present, he must further add a discrimination process of some kind which will clearly identify the past and future aspects of the ESP information, and then actively suppress such aspects, in order to enhance the detectability of the real time, desired ESP information. The output of the discrimination process, then, consists of some kind of information designed to influence the percipient's conscious guessing processes to correctly guess the present real time target, and to inhibit guessing target identities which are the same as the immediate future and the immediate past targets, lest the past or future be confused with the present. The non-conscious ESP and discrimination processes may certainly work intermittently and imperfectly, depending on other factors which could constitute both systematic or random noise at various stages in the total information flow system.

TRANS-TEMPORAL INHIBITION

What I am postulating, then, is an active inhibition of the precognitively and post-cognitively gained information about immediate future and immediate past, in order to enhance the detectability of ESP information about real time events. Since this inhibition extends over time, I have named this phenomenon trans-temporal inhibition.

Except for the unusual features of extending over time rather than space,

trans-temporal inhibition is analogous to a widely used information processing strategy in the nervous system called lateral inhibition[17]. This is a general phenomenon of a highly stimulated receptor sending out inhibitory impulses to receptor endings laterally/spatially adjacent to it, thus suppressing their initially weaker output, unless they are also strongly stimulated by an appropriate stimulus. It amounts to an edge detection process. To illustrate: if you press on your skin with a sharply pointed object, not only is the touch receptor immediately under the point strongly stimulated, but, because of the mechanical deformation of the skin, receptors laterally adjacent to the point are also stimulated, although less intensely. The neural impulses resulting at the first stage of detection, then, would be most intense immediately under the stimulated point, but fairly intense on each side of it, gradually tapering off, producing a neural signal pattern suggesting a blunt, rounded stimulating object, rather than a point. The most stimulated receptor under the point, however, sends out inhibitory impulses suppressing the weaker (less frequent) impulses from the laterally adjacent receptors, and so recovering a pattern indicating point stimulation further on in the nervous system. The phenomenon of trans-temporal inhibition, then, suggests that a generally useful information processing procedure is also operative for ESP.

How well does this theory fit the data?

APPLYING THE THEORY TO THE DATA

In showing the +1, real time, and -1 score patterns of percipient E1S1 earlier in Figure 8 (we shall ignore the -2 and -3 points from now on, as they are not related to other things), I indicated that the very significant degree of missing on the immediately past -1 target probably reflected maladaptive guessing habits on the percipient's part. The RNG is so constructed that there are no sequential dependencies, i.e., the probability of two sequential targets being a one-one is identical to that of their being a two-two, a three-three, a three-four, a one-nine, etc. People, however, have inaccurate conceptions of what random sequences are, and usually believe that the probability of the same target occurring twice is considerably less than that of a different target following the original one, that is that one-one, two-two, etc., are all much less probably than one-two, one-three, two-four, etc. Thus the percipients tend to avoid giving a response that is the same as the previous target, and I suggest that this accounted for the very large degree of the -1 missing. The theory of trans-temporal inhibition, however, assumes that the experienced present of this other dimension of the mind is probably symmetrical in most circumstances: this is an assumption that will be made, paralleling the general assumption that works so well in the physical sciences, namely that all physical processes are symmetrical[16]. Given this symmetry assumption, I then postulated that the -1 missing could be partialed into two components. One of these would be post-cognitive ESP inhibition of the calling of the previous target, and I would further assume that this component would be approximately equal in magnitude to the inhibition of the +1 response for each percipient, treated individually. The rest of the missing on the -1 past displacement would be due to maladaptive guessing strategies, this business of tending not to repeat the immediately past target. I have named this component of the -1 missing, strategy boundness. Figure 14 shows this partialing out applied to the data of percipient E1S1. For this particular example, about half of the -1 missing would be assumed to be due to trans-temporal inhibition of the post-cognitive response to the -1 target and half to maladaptive strategy boundness.

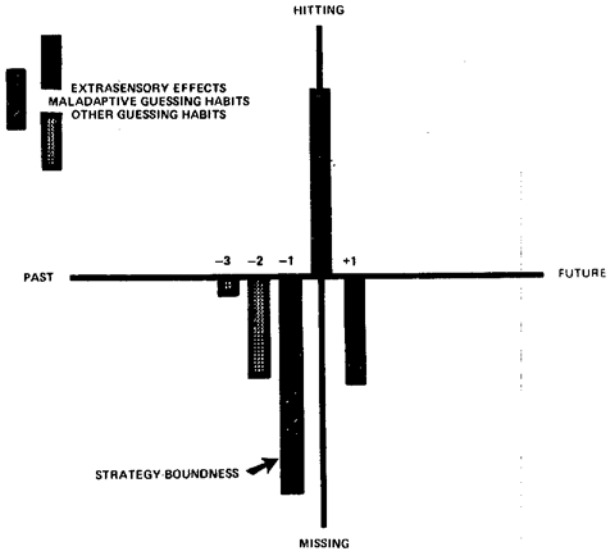

Fig. 14. Partialing out the strategy boundness measure from the total missing on the -1 temporal displacement.

My conception of the optimal way to try to use ESP is that all "rational" processes are irrelevant. A guessing strategy which involves keeping track of what the past targets have been and then trying to outguess the RNG is not only a waste of time (because of the sequential independence of the RNGO, but it distracts a percipient from turning his awareness toward more relevant mental processes, toward what we might call metaphorically "listening to the still small voice within" that might occasionally give a useful hint about target identity.

STRATEGY BOUNDNESS AND SUCCESS IN USING ESP

On theoretical grounds, then, we would expect that the more strategy boundness a

percipient showed, the less real time ESP he would show. Since trans-temporal inhibition of the future (and by assumption, of the past) target response is adaptive for enhancing real time ESP, we would also expect that with more strategy boundness there would be less missing on the +1 future target. The data bear this out quite convincingly.

Because the signs for the straight arithmetical computations of missing, strategy boundness, etc. require a good deal of attention to follow in terms of their relationships, I have taken the value of strategy boundness which is inherently negative (missing) and made it positive, to make the results clearer.

In orginally computing the correlations between real time hitting, +1 future missing, and -1 past missing for percipients in the combined two Training Studies, I found that +1 future missing was significantly correlated with real time hitting ($r = -.85$, $P < .001$), but the magnitude of -1 past missing did not correlate significantly with either the magnitude of real time hitting ($r = -.24$, non-significant) or with the magnitude of the +1 future missing ($r = +.14$, non-significant). After factoring out strategy boundness, as discussed above, it turns out that strategy boundness is significantly correlated with the other two measures. Strategy boundness correlates $r = -.64$, $P < .01$ with present time hitting, and $r = +.83$, $P < .001$, with +1 future missing. Referring back to Figures 9, 10, and 11, where the degree of individual strategy boundness was plotted for the percipients in the lower part of the graphs, the strength of this relationship is very clear. The more a percipient was caught up in maladaptive strategy boundness, the less likely he was to show real time hitting and the less likely he was to show trans-temporal inhibition, missing of the +1 future target. Strategy boundness can be conceived of as a failure to direct awareness to that part of the mind which is not so localized in space and time and so exercises ESP, but instead leaving awareness involved with ordinary aspects of the mind which cannot use ESP.

Applying the symmetry assumption, then, takes some random data (the absolute magnitude of the -1 past deviations) and partials it into highly meaningful data.

A FURTHER TEST OF THE THEORY

As I mentioned earlier, both percipients and experimenters in my two Training Studies were focused on the ordinary present, on the task of picking up real time information. This implicitly defined the immediate boundaries of the now as the +1 and -1 future and past target events. Since my data rarely suggest significant ESP missing on the +2 target (and, by the same sort of operations described above, on the -2 target), this suggests that while the experienced present of this other dimension of the mind was wider than the ordinary experienced present, it was not too much wider. Others' studies of precognition[8,9], however, have often dealt with events which are much further ahead in the future, minutes, hours, days, and sometimes months. Insofar as the trans-temporal inhibition theory is correct, I would predict that if the focus of attention is successfully placed on some future event, there ought to be ESP hitting on that event, but inhibition of responses to events temporally surrounding that future event. Using our filter analogy, with the experienced present of the dimension of the mind that uses ESP corresponding to the band width of that filter, it should be possible, by means of psychological processes, to shift the center point and/or the band width of the filter, and see a corresponding shift of trans-temporal inhibition. I have been able to carry out one test of this prediction to date.

Ingo Swann is a well know New York artist who posses a variety of ESP abilities which he has demonstrated under rigorous laboratory conditions in other investigators' laboratories, including Stanford Research Institute[18] and the City College of New York[19]. Swann was present at a small meeting of parapsychological researchers in October, 1976, when I presented the above data and the basic theory about trans-temporal inhibition, although I did not say much about the prediction of the possibility of shifting the center point of the experienced now of this other aspect of mind, or its predicted consequences. Swann was very intrigued by my data and made a number of useful comments on it, including his own observation that what he and the SRI researchers Targ and Puthoff called "analytical overlay" seemed to correspond to my concept of strategy boundness, any kind of "rational" but actually irrelevant activities that diverted one from relevant aspects of the ESP task. He wanted to try my ADEPT training device, and a few days later was able to briefly visit my laboratory.

I looked forward to his visit with considerable interest, for he would be the first percipient who, because he had heard about trans-temporal inhibition, would be psychologically set to have some concern with the immediate (+1) future target, as well as the real time target. I predicted he would probably show hitting on the +1 future target, but missing on the +2 future target. This is what happened.

Swann did 5 runs on ADEPT in the course of a little over an hour, for a total of 129 trials (in one run he inadvertently did 29 trials instead of the usual 25). He made 21 real time hits in the 5 runs, where only 12.9 would be expected by chance, $P = 9 \times 10^{-3}$, 1-tailed. In terms of +1 future scoring, he

made 19 hits when only 12.4 were expected by chance, P = .03, 1-tailed. His +1 precognition scores' significance is probably underrepresented by this conventional evaluation, because he tended to have bursts of hitting twice in a row on +1 precognition, and a separate evaluation of the probability of the number of doublet precognition hits he showed gives odds of 10^{-6}.

On +2 precognition hits, he scored only 7 hits when 11.9 would be expected by chance, P = .07, 1-tailed. This is not quite independently significant for below chance scoring by itself, but, as predicted, a t-test shows the difference between the scoring rate on the +1 and +2 hits is statistically significant (t = 2.59, 4 df, P < .05, 1-tailed)[20].

I later asked Swann if he was deliberately trying to guess the immediate future target as well as the real time target, and he replied that he had not been deliberately trying to do this, consciously he was concentrating on the real time target. This suggests that the passband of the "wider dimension filter" can be altered without there being full conscious awareness of it.

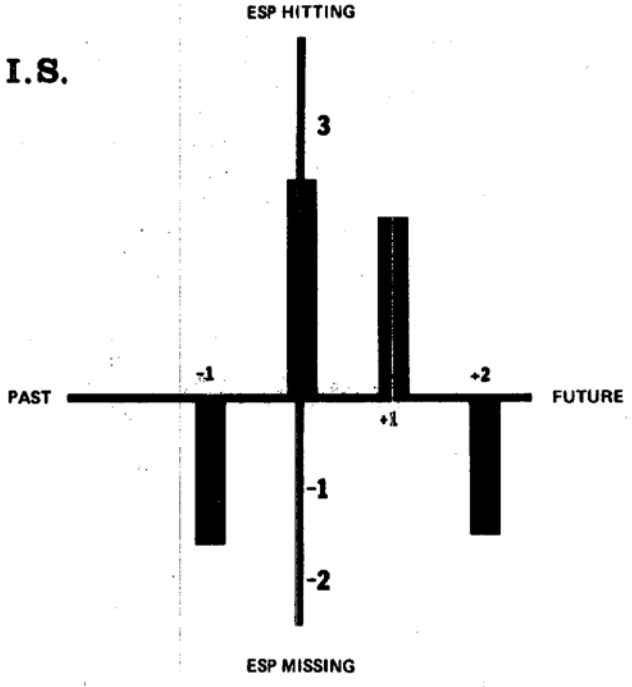

Fig. 15. Widened temporal passband for Ingo Swann.

Figure 15 shows Swann's performance on -1, real time, +1, and +2 temporal displacements. It is also interesting to note the magnitude of his -1 displacement score: it is only slightly larger than the +2 missing displacement, indicating a very low degree of strategy boundness. This is precisely what we would expect for someone with high ESP abilities. Incidentally, we should not overlook the fact that it is a quite amazing performance for Mr. Swann to have walked in "cold" off the street, as it were, and immediately shown statistically significant ESP in a new test situation.

Although it is a post hoc speculation, it is of interest to raise the question as to whether the "passbands" of some of the earlier percipients' trans-temporal inhibition processes were shifted in a manner analogous to Swann's. In the first Training Study, percipient E5S14 had Z-scores of -6.69 for -1 temporal missing, +1.04 for real time hits, +1.83 for +1 future hits, and -2.64 for +2 future missing, and the drop from +1 hitting to +2 missing is significant[21] (t = 3.40 with 19 df, P < .005, 1-tailed). In the second Training Study, percipient E4S4 had Z-scores of -5.48 for -1 temporal missing, -.89 missing on real time targets, +1.83 hitting on +1 future displacements, and -.78 on +2 missing. The difference between +1 hitting and +2 missing is significant (t = 2.00 with 19 df, P < .05, 1-tailed). The difference between +1 and +2 scoring for a third percipient from the second Training Study, E1S8, who showed a tendency toward hitting (Z = +1.06) on the +1 future target, is not at all significant (for +2, Z = +.62).

CONCLUSIONS

The major mystery about various kinds of ESP is how the information gets from the target to the percipient: once the percipient has "received" or "sensed" the information on some non-conscious level, it generally seems to be processed in psychologically familiar ways[22]. Trans-temporal inhibition is a general information processing procedure that is psychologically and neurologically familiar: the puzzle is in the precognitive (and postualted postcognitive) acquisition of the information about immediate future (and immediate past) targets.

Further data on these effects would be very desirable. Although emphasis of teaching improved ESP skills in our two studies made the provision of immediate feedback necessary, one clear line of research to follow, once percipients have been brought up to high levels of performance, is elimination of the feedback, so the postulated postcognitive inhibition component can be assessed independently of effects of maladaptive guessing habits. Further work on deliberatley shifting the focus of attention, as with Swann, is also needed. If the trans-temporal inhibition effect is validated, it ought to be possible to combine it with an information theory approach to optimize ESP performance: would long time intervals between trials, for example, make real time ESP more successful by reducing interference from future and past targets? Is comparing the contrast between real time hitting and +1 future missing a better measure of a percipient's

potential ESP capacity than hitting per se?

I plan considerably more analysis of the microstructure of the already collected data, and will, if funds become available, carry out further research along the lines suggested above. I hope others will investigate this fascinating new effect.

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